

## **Appendix 20: Confined Space Entry Program Information**

*Union Creek & Anthony Lakes Campground Complexes – Prospectus, Wallowa-Whitman National Forest*

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#### ***Overview***

A confined space is defined as any location that has limited openings for entry and egress, is not intended for continuous employee occupancy, and is so enclosed that natural ventilation may not reduce air contaminants to levels below the threshold limit value (TLV). Examples of confined spaces include: manholes, stacks, pipes, storage tanks, trailers, tank cars, pits, sumps, hoppers, and bins. Entry into confined spaces without the proper precautions could result in injury and/or impairment or death due to:

- An atmosphere that is flammable or explosive,
- Lack of sufficient oxygen to support life,
- Contact with or inhalation of toxic materials, or
- General safety or work area hazards such as steam or high pressure materials.

The overall objectives of this chapter are to provide the minimum safety requirements to be followed while entering, exiting and working in confined spaces during environmental restoration work. This chapter provides pertinent details on the following:

- \* Duties and responsibilities,
  - Identification and evaluation,
  - Hazard assessment,
  - Hazard controls,
  - Entry permits,
  - Entry procedures,
  - Opening a confined space,
  - Atmospheric testing,
  - Isolation and lockout/tagout safeguards,
  - Ingress/egress safeguards,
  - Warning signs and symbols,
  - Training, and
  - Emergency response.

#### ***Duties and Responsibilities***

##### **Project Manager**

The Project Manager should assign an individual within each project to act as the project Confined Space Coordinator. This individual should be responsible for implementing the confined space program in accordance with this chapter.

##### **Confined Space Coordinator**

The Confined Space Coordinator should be responsible for implementing the confined space program and should:

- Ensure that a list of confined spaces is maintained,
- Ensure that cancelled permits are reviewed for lessons learned,

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- Ensure training of personnel is conducted,
- Ensure coordination with outside responders,
- Ensure equipment is in compliance with standards, and
- Maintain a master inventory of identified confined spaces.

### Field Team Leader

The Field Team Leader in charge of any confined space work should:

- Ensure requirements for entry have been completed before entry is authorized;
- Ensure confined space monitoring is performed by personnel qualified and trained in confined space entry procedures;
- Ensure a list of monitoring equipment and personnel qualified to operate the equipment is maintained by the Safety and Occupational Health Office;
- Ensure that the rescue team has simulated a rescue in a confined space within the past twelve months;
- Know the hazards that may be faced during entry, including the mode, signs or symptoms, and consequences of exposure;
- Fill out a permit;
- Determine the entry requirements;
- Require a permit review and signature from the authorized entry supervisor;
- Notify all involved employees of the permit requirements;
- Post the permit in a conspicuous location near the job;
- Renew the permit or have it reissued as needed (a new permit is required every shift);
- Determine the number of attendants required to perform the work;
- Ensure the attendant knows how to communicate with the entrants and how to obtain assistance;
- Post any required barriers and signs;
- Remain alert to changing conditions that might affect the conditions of the permits, (i.e., require additional atmospheric monitoring or changes in personal protective equipment);
- Change and reissue the permit, or issue a new permit as necessary;
- Ensure periodic atmospheric monitoring is done according to permit requirements;
- Ensure that personnel doing the work and all support personnel adhere to permit requirements;
- Ensure the permit is canceled when the work is done; and
- Ensure the confined space is safely closed and all workers are cleared from the area.

### Entry Supervisors

An Entry Supervisor is a qualified person authorized to approve confined space entry permits. This person should be responsible for:

- Determining if conditions are acceptable for entry,
- Authorizing entry and overseeing entry operations,
- Terminating entry procedures as required,
- Serving as an attendant, as long as the person is trained and equipped appropriately for that role,
- Ensuring measures are in place to keep unauthorized personnel clear of the area,
- Checking the work at least twice a shift to verify and document permit requirements are being observed (more frequent checks should be made if operations or conditions are anticipated that could affect permit requirements),

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- Ensuring that necessary information on chemical hazards is kept at the work site for the employees or rescue team,
- Ensuring a rescue team is available and instructed in their rescue duties (e.g., an onsite team or a prearranged outside rescue service), and
- Ensuring at least one member of the rescue team has current certification in first aid and CPR.

### Employees Entering Confined Space

Employees who are granted permission to enter a confined space should:

- Read and observe the entry permit requirements;
- Stay alert to the hazards that could be encountered in a confined space;
- Use the protective equipment required by the permit;
- Immediately exit the confined space when:
  - Ordered to do so by the attendant,
  - Automatic alarms sound,
  - They perceive they are in danger, or
  - They notice physiological stresses or changes in themselves or co-workers (e.g., dizziness, blurred vision, shortness of breath).

### Attendant

The Attendant should be stationed outside the work space and should:

- Be knowledgeable of, and be able to recognize potential confined space hazards;
- Maintain a sign-in/sign-out log with a count of all persons in the confined space and ensure all entrants sign in/sign-out;
- Monitor surrounding activities to ensure the safety of personnel;
- Maintain effective and continuous communication with personnel during confined space entry, work and exit;
- Order personnel to evacuate the confined space if he/she:
- Observes a condition which is not allowed on the entry permit;
- Notices the entrants acting strangely, possibly as a result of exposure to hazardous substances;
- Notices a situation outside the confined space which could endanger personnel;
- Notices within the confined space a hazard which has not been previously recognized or taken into consideration;
- Must leave his/her work station; or
- Must focus attention on the rescue of personnel in some other confined space that he/she is monitoring;
- Immediately summon the Rescue Team if crew rescue becomes necessary; and
- Keep unauthorized persons out of the confined space, order them out, or notify authorized personnel of the unauthorized entry.

### Rescue Team

The Rescue Team members should:

- Complete a training drill using mannequins or personnel in a simulation of the confined space prior to the issuance of an entry permit for any confined space and at least annually thereafter;
- Respond immediately to rescue calls from the Attendant or any other person recognizing a need for rescue from the confined space;

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- In addition to emergency response training, receive the same training as that required of the authorized entrants; and
- Have current certification in first-aid and CPR.

### ***Identification and Evaluation***

The Project Manager should ensure a survey is conducted of the work site to identify confined spaces. This survey can be partially completed from initial and continuing site characterizations, as well as other available data (e.g. blueprints, job safety analysis). The purpose of the survey is to develop an inventory of those locations and/or equipment that meet the definition of a confined space. This information should be communicated to personnel and appropriate procedures developed prior to entry. The initial surveys should include air monitoring to determine the air quality in the confined spaces. The following situations should be evaluated by competent personnel:

- Flammable or explosive potential,
- Oxygen deficiency, and
- Presence of toxic and corrosive material.

### **Hazard Re-Evaluation**

The Project Manager should ensure the identification and re-evaluation of the hazards based on possible changes in activities, and/or other physical or environmental conditions, which could adversely affect work. A master inventory of confined spaces should be maintained. Any change in designation of a confined space will be routed through the Site Safety and Health Officer (SSHO) for review, prior to the change being made.

### **Hazard Assessment**

A hazard assessment should be completed prior to any entry into a confined space. The hazard assessment should identify the sequence of work to be performed in the confined space, the specific hazards known or anticipated, and the control measures to be implemented to eliminate or reduce each of the hazards to an acceptable level. No entry should be permitted until the hazard assessment has been reviewed and discussed by all persons engaged in the activity. Personnel who enter confined spaces should be informed of known or potential hazards associated with the confined spaces to be entered.

### **Hazard Controls**

Hazard controls include changes in the work processes and/or working environment with the objective of:

- Controlling the health hazards either by eliminating the responsible agents,
- Reducing health hazards below harmful levels, and
- Preventing the contaminants from coming into contact with the workers.

The following order of precedence should be followed in reducing confined space risks:

- Engineering controls, such as ventilation to limit exposure to hazards;
- Work practice controls, such as wetting of hazardous dusts, frequent cleaning; and
- Use of PPE, such as air purifying or supplied-air respirators.

### **Engineering Controls**

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Engineering controls are those controls, which eliminate or reduce the hazard through implementation of sound engineering practices. Ventilation is one of the most common engineering controls used in confined spaces. When ventilation is used to remove atmospheric contaminants from the confined space, the space should be ventilated until the atmosphere is within the acceptable ranges. Ventilation should be maintained during the occupancy if there is a potential for the atmospheric conditions to move out of the acceptable range. When ventilation is not possible or feasible, alternate protective measures or methods to remove air contaminants and protect occupants should be determined by the qualified person prior to authorizing entry. Conditions regarding continuous forced air ventilation should be used as follows:

- Employees should not enter the space until the forced air ventilation has eliminated any hazardous atmosphere,
- Forced air ventilation should be so directed as to ventilate the immediate areas where an employee is or will be present within the space,
- Continuous ventilation is maintained until all employees have left the space, and
- Air supply for forced air ventilation should be from a clean source.

### Work Practice (Administrative) Controls

Work practice (administrative) controls are those controls which eliminate or reduce the hazard through changes in the work practice (e.g., rotating workers, reducing the amount of worker exposure, housekeeping). Confined spaces should be cleaned/decontaminated of hazardous materials to the extent feasible before entry.

Cleaning/decontamination should be the preferred method of reducing exposure to hazardous materials. Where this is not practicable, PPE should be worn by the entry personnel to provide appropriate protection against the hazards which may be present.

### Personal Protective Equipment (PPE)

If the hazard cannot be eliminated or reduced to a safe level through engineering and/or work practice controls, PPE should be used. A qualified person should determine PPE needed by all personnel entering the confined space, including rescue teams. PPE which meet the specifications of applicable standards should be selected in accordance with the requirements of the job to be performed.

### Entry Permits

The Confined Space Entry Permit is the major tool in assuring safety during entry in confined spaces with known hazards or with unknown or potentially hazardous atmospheres. The entry permit process guides the supervisor and workers through a systematic evaluation of the space to be entered. The permit should be used to establish appropriate conditions. Before each entry into a confined space, an entry permit will be completed by a qualified person and the contents communicated to all employees involved in the operation and conspicuously posted near the work location. A standard entry permit should be used for all entries.

#### Key Elements for Entry Permits

A standard entry permit should contain the following items:

- Permit space to be entered;
- Purpose of the entry;
- Date of the permit and the authorized duration of the entry permit,
- Name of authorized entrants within the permit space;
- Means of identifying authorized entrants inside the permit space, e.g., rosters or tracking systems;
- Personnel, by name, currently serving as attendants,

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- Individual, by name, currently serving as entry supervisor, with a space for the signature or initials of the entry supervisor who originally authorized entry,
- Hazards of the permit space to be entered,
- Measures used to isolate the permit space and to eliminate or control permit space hazards before entry, e.g., lockout or tagout of equipment and procedures for purging, inerting, ventilating, and flushing permit spaces;
- Acceptable entry conditions,
- Results of initial and periodic tests performed, accompanied by the names or initials of the testers and by an indication of when the tests were performed;
- Rescue and emergency services that can be summoned and the means, (e.g., equipment to use, phone numbers to call) for summoning those services,
- Communication procedures used by authorized entrants and attendants to maintain contact during the entry,
- Equipment to be provided for compliance with this section, (e.g., PPE, testing, communications, alarm systems, and rescue);
- Other information whose inclusion is necessary, given the circumstances of the particular confined space, in order to ensure employee safety; and
- Additional permits, such as for hot work, that have been issued to authorize work in the permit space. Appendix D of 29 CFR 1910.146 provides an example permit containing these items. A permit is only valid for one shift. For a permit to be renewed, several conditions should be met before each re-entry into the confined space. First, atmospheric testing should be conducted and the results should be within acceptable limits. If atmospheric test results are not within acceptable limits, precautions to protect entrants against the hazards should be addressed on the permit and should be in place. Second, a qualified person should verify that all precautions and other measures called for on the permit are still in effect. Finally only operations or work originally approved on the permit should be conducted in the confined space.

A new permit should be issued or the original permit reissued whenever changing work conditions or work activities introduce new hazards into the confined space. The employer should retain each cancelled entry permit for at least one year to facilitate the review of the confined space entry program. Any problems encountered during an entry operation should be noted on the pertinent permit so that appropriate revisions to the confined space permit program can be made.

### Entry Procedures

Whenever entry into a confined space is needed, either an Entry Supervisor or the person in charge of the job may initiate entry procedures, including the completion of a confined space entry permit. Entry into a confined space should follow the standard entry procedure.

The following are requirements for standard entry:

- Training to establish personnel proficiency in the duties required,
- Atmospheric testing for entry, and
- Atmospheric monitoring during the entry.
- Before an employee enters the space, the internal atmosphere should be tested with a calibrated, direct-reading instrument. If a hazardous atmosphere is detected during entry:
- The space should be evaluated to determine how the hazardous atmosphere developed, and
- Measures should be implemented to protect employees before any subsequent entry takes place.

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Personnel should be prohibited from entering hazardous atmospheres without wearing proper respiratory equipment as determined by qualified entry supervisors. The entire confined space entry permit should be completed for a standard entry. Entry should be allowed only when all requirements of the permit are met and it is reviewed and signed by an Entry Supervisor.

### Opening a Confined Space

Any conditions making it unsafe to remove an entrance cover should be eliminated before the cover is removed. When entrance covers are removed, the opening should be promptly guarded by a railing, temporary cover, or other temporary barrier that will prevent anyone from falling through the opening. This barrier or cover should protect each employee working in the space from foreign objects entering the space. If it is in a traffic area, adequate barriers should be erected.

### Atmospheric Testing

Atmospheric test data is needed prior to entry into any confined space. Atmospheric testing is required for two distinct purposes: evaluation of the hazards of the permit space and verification that acceptable conditions exist for entry into that space. If a person must go into the space to obtain the needed data, then Standard Confined Space Entry Procedures should be followed (i.e., rescue team, attendant, entry supervisor). Before entry into a confined space, a qualified person should conduct testing for hazardous atmospheres. The internal atmosphere should be tested with a calibrated, direct-reading instrument for the following, in the order given:

- Oxygen content,
- Flammable gases and vapors, and
- Potential toxic air contaminants.

Testing equipment used in specialty areas should be listed or approved for use in such areas. This listing or approval should be from nationally recognized testing laboratories such as Underwriters Laboratories or Factory Mutual Systems.

### Evaluation Testing

The atmosphere of a confined space should be analyzed using equipment of sufficient sensitivity and specificity. The analysis should identify and evaluate any hazardous atmospheres that may exist or arise, so that appropriate permit entry procedures can be developed and acceptable entry conditions stipulated for that space. Evaluation and interpretation of these data and development of the entry procedures should be done by, or reviewed by, a technically qualified professional (e.g., OSHA consultation service, certified industrial hygienist, registered safety engineer, certified safety professional).

### Verification Testing

A confined space which may contain a hazardous atmosphere should be tested for residues of all identified or suspected contaminants. The evaluation testing should permit specified equipment to determine that residual concentrations at the time of testing and entry are within acceptable limits. Results of testing (i.e., actual concentration) should be recorded on the permit. The atmosphere should be periodically retested to verify that atmospheric conditions remain within acceptable entry parameters. Initial testing of atmospheric conditions and subsequent tests after a job has been stopped should be done with the ventilation systems shut down. If the confined space is vacated for any period of time, the atmosphere of the confined space should be retested before

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re-entry is permitted. Further testing should be conducted with ventilation systems turned on to ensure the contaminants are removed and that the ventilation system is not causing a hazardous condition.

### Acceptable Limits

The atmosphere of the confined spaces should be considered within acceptable limits whenever the following conditions are maintained:

- Oxygen - 19.5% to 23.5%,
- Flammability - less than 10% of the Lower Flammable Limit (LFL), and
- Toxicity - less than recognized ACGIH exposure limits or other published exposure levels (e.g. OSHA PELs, NIOSH RELs).

Whenever testing of the atmosphere indicates levels of oxygen, flammability, or toxicity that are not within acceptable limits, entry should be prohibited until appropriate controls are implemented. If the source of the contaminant cannot be determined, precautions should be adequate to deal with the worst possible condition in the confined space. If there is the possibility that the confined space atmosphere can become unacceptable while the work is in progress, the atmosphere should be constantly monitored and procedures and equipment should be provided to allow the employees to quickly and safely exit the confined space.

### Isolation and Lockout / Tagout Safeguards

All energy sources which are potentially hazardous to confined space entrants should be secured, relieved, disconnected and/or restrained before personnel are permitted to enter the confined space. Equipment systems or processes should be locked out or tagged out or both per 29 CFR 1910.147 and ANSI Z244.1-1982, Lockout/Tagout of Energy Sources prior to permitting entry into the confined space. The current lockout/tagout program being used at the site should be used as guidance. In confined spaces where complete isolation is not possible, provisions should be made for as rigorous an isolation as practical. Special precautions should be taken when entering double walled, jacketed, or internally insulated confined spaces that may discharge hazardous material through the vessel's internal wall. Where there is a need to test, position or activate equipment by temporarily removing the lock or tag or both, a procedure should be developed and implemented to control hazards to the occupants. Any removal of locks, tags, or other protective measures should be done in accordance with ANSI Z244.1-1982.

### Ingress / Egress Safeguards

Means for safe entry and exit should be provided for confined spaces. Each entry and exit point should be evaluated to determine the most effective methods and equipment to be utilized to enable employees to safely enter and exit the confined space. Appropriate retrieval equipment or methods should be used whenever a person enters a confined space. Use of retrieval equipment may be waived by the designated qualified persons if use of the equipment increases the overall risks of entry or does not contribute to the rescue. A mechanical device should be available to retrieve personnel from vertical type confined spaces greater than five feet in depth.

### Warning Signs and Symbols

All confined spaces that could be inadvertently entered should have signs identifying them as confined spaces. Signs should be maintained in a legible condition. The signs should contain a warning that a permit is required before entry. Accesses to all confined spaces should be prominently marked.

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### Training

The employer should provide training so that all employees whose work is regulated by this section acquire the understanding, knowledge, and skills necessary for the safe performance of their duties in confined spaces.

Training should be provided to each affected employee:

- Before the employee is first assigned duties under this section,
- Before there is a change in assigned duties,
- Whenever there is a change in permit space operations that presents a hazard for which an employee has not been trained, and
- Whenever the employer has reason to believe either that there are deviations from the permit space entry procedures required in this section or that there are inadequacies in the employee's knowledge or use of these procedures. The training should establish employee proficiency in the duties required by this section and should introduce new or revised procedures, as necessary, for compliance with this section.

### General Training

All employees who will enter confined spaces should be trained in entry procedures. Personnel responsible for supervising, planning, entering or participating in confined space entry and rescue should be adequately trained in their functional duties prior to any confined space entry.

Training should include:

- Explanation of the general hazards associated with confined spaces;
- Discussion of specific confined space hazards associated with the facility, location or operation;
- Reason for, proper use, and limitations of PPE and other safety equipment required for entry into confined spaces;
- Explanation of permits and other procedural requirements for conducting a confined space entry;
- A clear understanding of what conditions would prohibit entry;
- How to respond to emergencies;
- Duties and responsibilities as a member of the confined space entry team; and
- Description of how to recognize symptoms of overexposure to probable air contaminants in themselves and co-workers, and method(s) for alerting attendants. Refresher training should be conducted as needed to maintain employee competence in entry procedures and precautions.

### Specific Training

#### Training for Atmospheric Monitoring Personnel

Training should include proper use of monitoring instruments such as:

- Proper use of the equipment;
- Knowledge of calibration;
- Knowledge of sampling strategies and techniques; and
- Knowledge of PELs, TLVs, LELs, UELs, etc.

### Training For Attendants

Training should include the following:

- Procedures for summoning rescue or other emergency services, and

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- Proper utilization of equipment used for communicating with entry and emergency/rescue personnel.

### Training for Emergency Response Personnel

Training should include:

- Rescue plan and procedures developed for each type of confined space that are anticipated to be encountered,
- Use of emergency rescue equipment,
- First aid and CPR techniques, and
- Work location and confined space configuration to minimize response time.

### Verification of Training

Periodic assessment of the effectiveness of employee training should be conducted by a qualified person. Training sessions should be repeated as often as necessary to maintain an acceptable level of personnel competence.

### Emergency Response

#### Emergency Response Plan

A plan of action should be written with provisions to conduct a timely rescue for individuals in a confined space should an emergency arise.

Retrieval Systems or Methods to Facilitate Non-entry Rescue Retrieval systems should be used whenever an authorized person enters a permit space, unless the equipment increases the overall risk of entry or the equipment would not contribute to the rescue of the entrant. Retrieval systems should have a chest or full body harness and a retrieval line attached at the center of the back near shoulder level or above the head. If harnesses are not feasible or create a greater hazard, wristlets may be used in lieu of the harness. The retrieval line should be firmly fastened outside the space so that rescue can begin as soon as anyone is aware that retrieval is necessary. A mechanical device should be available to retrieve personnel from vertical confined spaces more than five feet deep.

### References

1. 29 CFR 1910.146, "Permit-required Confined Spaces."
2. National Safety Council Data Sheet 12304-0704, "Confined Space Entry Control System for Research and Development Operations."
3. American National Standard Institute (ANSI) Z117.1-1989, "Safety Requirements for Confined Spaces."
4. DHHS (NIOSH) Publication No. 87-113, "Working With Confined Spaces."
5. ANSI Z 244.1-1982, "Lockout/Tagout of Energy Sources."
6. 29 CFR 1910.147, "The Control of Hazardous Energy (Lockout/Tagout)."